

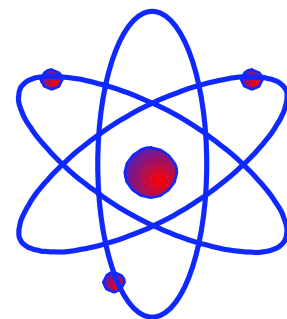
# High Performance Computing & Scientific Visualization



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# Agenda

- Scope of Service
- Current Environment
- Objectives/Vision
- Constraints/Minimum Requirements
- Summary

# Scope of Service

## Support for Agency Goals

- HPC/Vis directly supports GPRA goals:
  - Clean Air & Water
  - Pollution Prevention and Reduction
  - Sound Science
  - Greater Innovation
- Models are getting more sophisticated (complex, temporal, spatial, multilayered)
- Better computing => better environmental science

# Scope of Service

## Agency & Infrastructure

- Provide HPC and Scientific Visualization in support of initiatives protecting the following:
  - Environment
  - Human health
- Infrastructure support for both HPC & Scientific Visualization:
  - Hardware
  - Operating system software
  - COTS & custom software

# Scope of Service

## HPC/Vis Application Support

- Environmental Modeling & Application Development
- Customer Technical Support
- Capacity Planning
- Code optimization and code porting
- Hardware/software acquisition and maintenance
- Pathfinder and Testbed functions
- Outreach
- User Training

# Current Environment

## Cray T3E - HPC

- Platform: Cray T3E
- Hardware:
  - CPU Capacity: 120 Processors / 144 GFLOP peak
  - Storage Capacity 256 MW/PE => 30GB / 1.2 Terabyte disk
- Growth Trends:
  - Utilization statistics will be posted on the OAM web site

# Current Environment

## IBM SP/2 - HPC

- Platform: IBM SP/2:
  - CPU Capacity: 3 nodes, 16 CPU/node & 16 GB/node.
    - ▶ 48 CPU total ~~ 72 GFLOP peak.
    - ▶ 48 GB main memory, 4 TB disk.
- Growth Trends:
  - Utilization statistics will be posted on the OAM web site

# Current Environment

## Customer Base

- Customer Community:
  - 100 Active Users of approx. 200
  - Scientific researchers and policy analysts from Program Offices, Regional Offices, and Laboratories
  - Collaborative partners such as States and Universities.
- Air Modeling (60%): NERL & OAQPS
- Earth Systems (20%): ORD/Athens & Corvallis
- Auto Emissions (5% & growing): ORD/AnnArbor
- Molecular Chemistry (10%): NHEERL & LV
- CBPO: (5%): OW



# Current Environment

## Recent Accomplishments

- Upgraded IBM SP/2 to 48 processors and 48 GB memory
- Upgraded Sun 4500 FS to dual systems
  - Clustered to eliminate bottlenecks and single point of failure
- Implemented high speed interface switch to allow multiple architectures in HPC environment
- Some Cray C90 ported to IBM SP/2

# Current Environment

## Work in Progress

- Near Term Goals

- Evaluate feasibility of Beowulf clusters for "local" HPC
- Optimize and maximize usage of existing HPC/Vis infrastructure
- Institute robust capacity planning and management
- Deploy a Web-based portal of HPC users and EPA management

# Current Environment

## HPC/Vis Support Challenges

- Growing user base
- Limited awareness of contribution of HPC/vis cycles & expertise to EPA's mission
- Rapid changes in technologies
- Security continues to be difficult
- Requested hours exceed available hours
- Data and users are spatially distributed
- Science is becoming more collaborative and multidisciplinary
- Models and data are growing (150 GB to 1,000 GB)
- Data storage (75 TB & growing by 40 GB day)

## Interaction with other Contracts

- **ITS-EPA (DynCorp Team) - Computer Operations**
- **IIASC (SRA) - Advisory & Assistance Services**

# Objectives/Vision

- Continue to develop & implement 5 Year Strategic Plan
- Maintain tight security, especially for remote access
- Reduce costs/improve service levels
- Increase flexibility in meeting customer needs
- Eliminate administrative burdens of property management and capital investment
- Provide continuous and proper training of HPC operators
- Promote collaborative agreements with entities outside of EPA
- Solicit business from outside of EPA

# Constraints/Minimum Requirements

- Transition to a new contract must be seamless
- Contractor must support all functional HPC/Vis requirements during transition
- Service level agreements must be met
- No down time other than regularly scheduled maintenance
- EPA's critical initiatives continue to be supported at a high level of quality
- Multifunctional teams are productive and provide value-added services
- Continued development/implementation of Strategic Plan

# Summary

- ESE will continue to be primary support for Agency's
  - High Performance Computing Program
  - Scientific Visualization Program
- Success requires pool of highly talented people with unique skills
- Requirements for HPC/Vis will continue to grow & expand
- People, infrastructure, network, and security are key components

# Questions

